The Excavating Engineer

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Present Open Pit Practice at the United Verde Mine

By E. M. J. Alenius

Operation of 1¾-Yard Electric Full-Revolving Shovel at Jerome, Arizona, in Copper Ore, Served by Motor Trucks and Classifying Ore by Dumping into Transfer Raises

OPEN pit mining has been in operation at the United Verde Copper Mine, Jerome, Arizona, for the past seven years. This type of mining was decided upon as being the only feasible way of removing high-grade ore which has been abandoned in the upper levels because of serious fires breaking out from time to time. The work has been carried on continuously since 1919, with the exception of the shutdown in 1921.

The Ore Zone

The ore zone of the United Verde is a massive sulphide (chiefly pyrite) pipe-like mass containing chalcopyrite bearing shoots, more or less bordered by sulphide bearing schists, especially on the southeasterly (footwall) side. The total mineralized zone is 1000 feet by 800 feet in plan, and has been opened to a depth of 3000 feet. It dips steeply to the northwest. The upper portion of the ore body has undergone considerable oxidation to slightly below the 160 mine level. On the north side, persisting below the zone of oxidation, is a considerable body of primary siliceous ore, chiefly valuable as converter flux.

The waste material is a dense augitediorite, very hard, tough, and not easily blasted. In the ore zone the rock is classified as dike, oxide, schist, quartz, porphyry, and massive sulphide, the dike being very soft and requiring no blasting, while the massive sulphide is very hard to break and difficult to dispose of.

The First Plan Unsuccessful

As originally planned, the entire ore body would be exposed on the 300-foot mine level. Above this level the ground would be stripped back on a ½ to 1 slope by steam shovels working on a series of benches. Below the 300-foot level, the ore was to be removed by glory hole methods to the 500-foot level. The plans were later changed so that the major stripping operations should not extend below the 160-foot level.

Three steam shovels, one Model 300 Marion, and two railroad-type Osgoods were purchased for the stripping operations. On the first of January, 1926, 5,787,093 cubic yards of stripping, together with some 807,977 cubic yards of ore, has been removed by these three shovels above the 160-foot level. There then remained but 1,222,000 cubic yards of stripping and 190,000 cubic yards of ore to be removed above the 160-foot level. At present it appears that this yardage above the 160-foot level will be removed by May 1, 1927.

As the ore body was being exposed on the 160-foot level, several glory holes were started, the ore when broken falling through raises to the ore bins on the mine haulage level or the 1000-foot level. This method of mining was soon found to be unsatisfactory, the chief reason being that it was impossible to obtain a clean separation between sulphide ore, siliceous ore, and waste ma-

Two Electric Shovels in Sub-grade Cuts — Note the Glory Hole in Central Background

terial. Limited production and hazardous working conditions also led to the abandonment of this method as the principal means of working out the ore body. A few small glory holes are however worked at present, being in areas of fairly uniform material.

New Plan of Excavation Put Into Operation in March, 1925

A plan was put into effect by Mr. W. V. De Camp, general superintendent, whereby the material below the lower stripping level should be dug out by shovels of small capacity, loaded into motor trucks, and dumped into any one of several transfer raises to the 1000-foot level, thereby effecting a classification of the material. This plan allows for maximum flexibility, for by maintaining separate transfer raises for sulphide ore, siliceous ore, and waste, the material can be conveniently routed to a raise, permitting continuous operating of the small shovel.

1¾-Yard Electric Shovel Purchased for Job

After careful consideration, a Bucyrus 50-B electric shovel with a 1¾-yard dipper was purchased and placed in operation in March, 1925. The shovel cut its way down on an incline on the side of one of the glory holes until a depth of 25 feet below the 160-foot level was obtained. The material handled in cutting down was disposed of by casting into the glory hole. A thorough cut was also made by one of the railroad shovels connecting the various disposal raises, so that as soon as the 50-B shovel reached grade, trucks were placed in service, and the plan was in operation.

A Marion Model 300 Shovel Loading Quartz Ore

The trucks used for this purpose were the light aviation type of army truck, equipped with a side dump body. At present careful investigation is being made of other types of trucks which may better serve the purpose. Three trucks have been found necessary to keep the 50-B shovel in continuous operation, the average tram being about 500 feet. Each truck has a capacity of about two cubic yards of material in place, varying from 3.5 to 5.0 tons depending on the character of material handled.

A Second 1¾-Yard Shovel Put In Operation in March, 1926

During the eight months the first 50-B shovel was in operation a total of 133,217 cubic yards of material was disposed of.

A second Bucyrus 50-B shovel was put into operation in March, 1926. This shovel has been improved in detail since the first shovel was purchased. The depth of the boom was substantially increased, and the boom steadied by guy cables.

The First of the 1¾-yard Bucyrus Electric Shovels

Heavier dipper sticks were provided, and slight changes were made in the shipper shaft, pinion and saddle block arrangement. All of these changes were very practical, as the character of the material handled at the United Verde Mine warrants the heaviest construction.

Power is furnished from the sub-station outside of the pit limit through armored cables buried in the ground and connected to switch boxes placed at convenient locations in the pit. From the switch boxes the power is carried through super service cables having a ¼-inch covering of rubber. The power consumption per cubic yard handled amounts to 1.3 k.w.h. This figure also includes any power for lighting the pit at night.

The shovels are operated two shifts per day, a nine-hour shift from 7:30 a.m. to 5:00 p.m. and an eight-hour shift from 6:00 p.m. to 2:00 a.m. For the first three months in 1926 an average of 325 cubic yards per eight-hour shift was handled. The shovels operated at an efficiency of 62.8 per cent, 37.2 per cent of the operating time being lost by moving, blasting, truck, repair, and miscellaneous delays.

During the progress of the major stripping operations, the ground was broken by blasting machine-drilled holes, churn drill holes, and by the use of coyote drifts, or by a combination of these methods. On account of the uniform character of the waste material and the ability to handle and dispose of the broken rock, it was possible to carry out these operations on a very large scale.

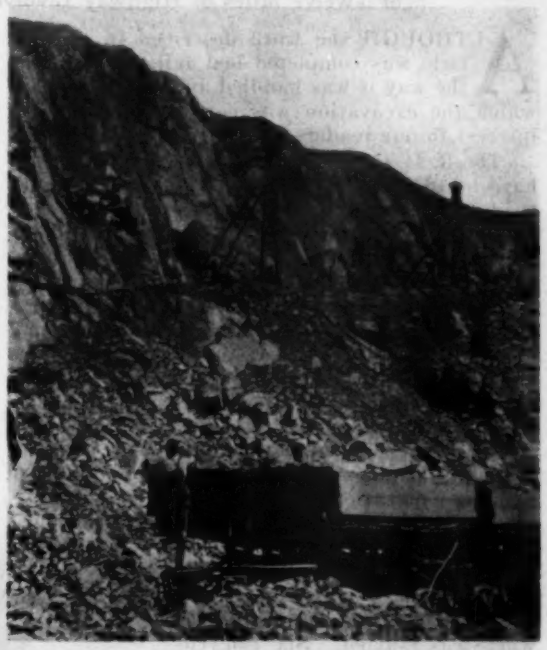
However, in the present mining operations, because of the decreased production, the character of the broken material desired, and the care which must be taken to separate the ore from the waste, it has been found advisable to break all ground by blasting Jackhammer drill holes. The depth, spacing, and location of holes are dependent entirely upon the knowledge of ore conditions where ore shoots are separated by waste stringers but a few feet in width. In portions of the ore body where the rock is more or less persistent in character and position, both vertical and bank holes are drilled. Such holes are spaced from six to eight feet apart and are drilled to a maximum depth of 20 feet. The closeness of spacing enables a better shattering effect to be obtained, thus decreasing the necessity of secondary blasting and the cost of ore crushing, and permitting efficient handling of the broken material.

Blasting Methods

All holes are drilled dry by Sullivan "DP331" Jackhammers, using ⅞-inch hollow square steel with a starter gauge of 2¼ inches, decreasing ⅛-inch every two-foot change to a gauge of 1¼ inches on a 20-foot steel. The drill holes are sprung as many as three times before being loaded, using one stick of gelatine for the first spring, three for the second, and ten for the final spring. When blasted the holes are loaded with a maximum of 50 pounds of explosive. 35 per cent Apache Gelatine in sticks from ⅞-inch to 1¼ inches in diameter is used for primary blasting. Some 50 per cent Gelatine is used for secondary blasting. No. 8 Blasting Caps fired from a blasting machine are used for detonating the explosives for primary blasting.

Looking down from one of the upper benches of the shovel pit. The shovel, an Osgood railroad-type mounted on Bucyrus caterpillar traction, is loading slag from above the ore body.

Throughout the ore zone, many old abandoned stopes are encountered. Oftentimes the shovel operations are seriously hampered by old mine timbers which have to be disposed of. A Fordson crane is used for tearing out the old timbers and loading them so they can be removed from the pit. In certain areas, sulphur gas works its way through to the surface from the burning ground beneath. This gas is very obnoxious and irritating, making it necessary for shovel crews and others to wear gas masks when working in the vicinity of the gas outlets.



Well Drills at Work Drilling Diorite Waste for Blasting

Material to Be Removed on Twelve Benches

On the first of January, 1926, there remained within the proposed pit limits some 3,600,000 cubic yards of material to be removed by the small electric shovels. This material will be removed on benches varying in height from 25 to 30 feet. The work will be carried down on twelve such benches before the 500-foot level is reached. In starting a new bench a thorough cut having approximately a 7½-foot bench is made connecting an ore raise and a waste raise. Four thorough cuts are necessary to obtain a depth of 30 feet.

Dumping raises for ore and waste are immediately available as soon as the level is established. When the complete plan is in operation it is expected that 60,000 cubic yards of material will be handled each month. At this rate open pit operations at the United Verde Mine will continue over a period of six years.

The open pit work is under the direction of J. C. Perkins, superintendent of the steam shovel department; J. R. Allen is general foreman; and Josh Lavers is master mechanic. The steam shovel department at present maintains its own office force, engineering department, mechanical shops, and warehouse.

A Highway Job in Pennsylvania

Both Diesel and Steam Shovels Used by R. H. Cunningham & Sons Company in the Construction of Twelve Miles of Highway Involving 100,000 Cubic Yards of Excavation

ALTHOUGH the work described in this article was completed last fall, we feel that the way it was handled and the speed with which the excavation was completed will be of interest to our readers.

The R. H. Cunningham & Sons Company, who have built many miles of both state and county roads, and who have also done considerable coal stripping, were awarded a contract on April 23rd for the construction of twelve miles of reinforced concrete highway.

This highway work lay in both Bell and Burnside Townships, Clearfield County, Pennsylvania, and involved the excavation of about 100,000 cubic yards, both earth and rock. The contract with the Pennsylvania Department of Highways called for the completed road, surfaced with reinforced concrete. The total amount of the contract including paving was $674,000, while the price paid for excavation was $1.50 per cubic yard.

The R. H. Cunningham & Sons Company lost no time in getting to work, for on May 1st, just eight days after the awarding of the contract, the equipment was on the job and the work was started. Six Bucyrus shovels were moved in on the job, a 1-yard steam machine, a ¾-yard steam machine, two ¾-yard Diesel machines, a ⅝-yard and a 1½-yard steam machines. These shovels were served with both wagons and trucks, comparatively little overcasting being encountered. A number of heavy rock cuts were encountered which averaged about 20 feet deep. Rock was drilled with well drills and the material broken up with dynamite.

Diesel Shovel Fuel Oil Consumption

The Diesel shovels burned Diesel fuel oil, which was delivered on the job in drums, and each machine burned approximately fifteen gallons a day. The steam machines used coal delivered by truck, and obtained their water pumped from streams along the route of the construction, through a temporary pipe line.

In some places extremely soft going was encountered, and considerable difficulty experienced from time to time. When warned of soft ground the shovels worked on mats made of planks.

Five 30-ton steam rollers were used to prepare the new grade for the surface. This surface of reinforced concrete was 16 feet wide and had a depth of 6 inches at sides and center, the crown of the road being 2 inches. The actual paving was done by a 21-E Foote paver, although in addition to this machine two mixers were on the job, namely a 21-E Foote and a 21-E Koehring.

The entire job was under the direct supervision of R. J. Cunningham, secretary of the company, of which J. S. Cunningham is president, and J. S. McFeatters, vice-president and treasurer. The head office is at 617 Penn Ave., Turtle Creek, Pa.

One of R. H. Cunningham & Sons Company's ¾-Yard Diesel Shovels at Work on Highway Construction

John F. Casey's Work on the Canton-Bayard Cut-Off

Description of the Work on Section No. 3 Which Involves 1,100,000 Cubic Yards of Excavation—More than One-Half the Total Required by This Work Being Done by the Pennsylvania Railroad

THE excavation of 2,000,000 cubic yards of earth and rock seems like a large amount of digging for a stretch of double-track railroad only fifteen miles in length, but that is what the Pennsylvania Railroad is doing in eastern Ohio, on the Canton-Bayard Cut-Off. This railroad work, just across the line from Pennsylvania, will cost $4,500,000 when completed, and will provide a .3 per cent grade route from Stark Yard to Pittsburgh as compared with the 1 per cent grade route over the present Eastern Division of the Pittsburgh, Fort Wayne and Chicago Railway. The new route will make possible the operation of maximum trains instead of those limited in weight by the present heavy grades. It will provide a route that is one and one-half miles shorter, and it will separate the freight traffic, which will run over it, from the heavy Eastern Division passenger business, which will be handled over the old line.

Dumping Material at One of the Fills

No Grade Crossings

There will be no grade highway crossings on the entire line. At the main line of the Fort Wayne Division near Louisville, the westbound track of the cut-off crosses by way of an overhead crossover, which will avoid an extremely busy grade crossing. With the exception of two places, there will not be a curve greater than one degree, and of these two the greatest is only four degrees.

Work Divided Into Four Sections

The excavation work was divided into four sections and contracts let to three companies. Section No. 1 went to A. Guthrie & Co., Inc., St. Paul, Minnesota; Sections Nos. 2 and 4 to Ferguson & Edmondson Company of Pittsburgh and No. 3 to John F. Casey Company of Pittsburgh.

A. Guthrie has a Marion Model 125 shovel working in a rock cut, 86 feet deep, and a Marion Model 36 working in a 70-foot cut. Guilford & Wright of Akron, Ohio, have a subcontract in this section and are using three Erie shovels. A Vulcan, a Porter and two Davenport locomotives are handling the Western dump cars used in this section. Two Sanderson-Cyclone drills are in operation, with compressed air supplied by an Ingersoll-Rand compressor.

The Ferguson & Edmondson Company are using two Erie shovels, two Marion Model 60 shovels and a Marion Model 21 in Sections Nos. 2 and 4. At Section No. 2, 4-yard dump cars handled by Vulcan and Porter locomotives are doing the hauling. Section No. 4 is nearly all team work, two Western elevating graders and a small Erie shovel being used to load dump wagons.

Eight Shovels on John F. Casey's Section

Section No. 3 is the largest, it alone entailing 1,100,000 cubic yards of the total 2,000,000 yards

Cold Weather Operations in One of the Heavy Rock Cuts; Note Men in Foreground Laying Compressed Air Line for Tripod Drill.

In this heavy shale cut the 1¼-yard Bucyrus shovel shown in the middle of the picture, served by trains of ten 4-yard Western dump cars hauled by Porter and Baldwin locomotives, holds both the daily and monthly output record for the entire project.

Atlantic No. 45 and Marion Model 60 in a 375,000-Cubic-Yard Rock Cut; Keystone Well Drills in the Foreground.

in the entire cut-off. Some of the cuts are as deep as 100 feet. They are made 40 feet wide at subgrade, with slopes of 1 on ¾ in rock and 1 on 1½ in earth. The fills are made 38 feet wide on grade, sloping 1 on 1½. The John F. Casey Company has eight steam shovels at work on this section and four concrete outfits. The largest of the cuts, a ninety-foot rock cut of 375,000 cubic yards, is being excavated by two railroad-type steam shovels, an Atlantic Class-45 and a Marion Model 60. In taking off the top lifts of this cut, trains of six 4-yard dump cars were operated over a 12 per cent grade 1000 feet long. Keystone well drills and Ingersoll-Rand pneumatic drills were employed ahead of the shovels. Blasting was done with Du Pont, Grasselli and Hercules dynamite.

1¾-Yard Shovel Holds Output Record

The next largest cut is 3,600 feet long and 45 feet deep. At this cut a Marion Model 36 and a Bucyrus 50-B have been put to work. T. J. Scoville, Nevin Meyers and B. F. Harris are the crew of the Bucyrus 50-B, and are to be especially commended in the results they have achieved, for their machine holds the yardage record against any shovel on the entire project, and has held this record for every month that the work has been in operation.

Western 4-yard dump cars hauled by one Baldwin and five Porter locomotives are serving the shovels in this section. There are several large fills to be constructed, but even as large as these are there is approximately 450,000 cubic yards of excavated material wasted.

Caterpillar Tractor Pulling Elevator Grader on James L. Ward Subcontract

The ends of the cuts are being shaped up by two Erie shovels, and a Northwest crane is clamming ditches.

The 11,000 cubic yards of concrete work was divided into twelve structures, the more important being two concrete viaducts and three arch bridges, one of which has a span of 121 feet. The materials for this concrete work were hauled by a fleet of trucks from Robertsville to the Koehring mixers on the job and the concrete was placed with Insley mast hoists and chutes.

Two Subcontractors

The end cut of the section, a 65-foot rock cut of 170,000 cubic yards, has been sublet to the J. G. Cleaver Co. who are operating a Marion Model 50 shovel.

A Second View of Cut No. 6 Showing the 1¾-Yard Shovel at Work in the Shale

Several small cuts have been sublet to James L. Ward, who is using a team outfit with an elevating grader and an Osgood shovel.

Over 250 Men on Section No. 3

Altogether there are 265 men at work on Section No. 3, including the concrete crews. Walter Walsh, superintendent, is in complete charge of the work in the field. Chas. Bixby is walker on the largest of the cuts, and P. H. Kennedy has charge of cut No. 6. F. R. Campuzano and W. M. Beyers assisted Mr. Walsh in rushing the concrete work to completion before winter.

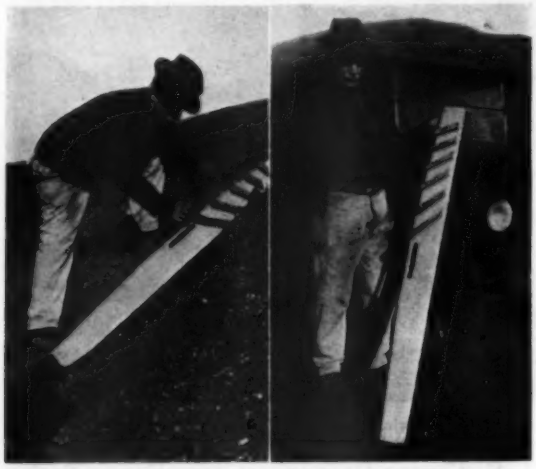
John Cain operates the Marion Model 36. A. F. Smith and Shorty Doak operate the two Erie Type B shovels. Walter Bixby is on the Northwest crane, and Al Searles operates the Osgood shovel. Mike Kunkle and Paul Jacobs are the runner and cranesman on the Marion Model 50. Guy Storr, John Miller and Cy Thompson are the runner, cranesman and fireman respectively on the Marion Model 60. D. H. Conley, Mickey Welch and Geo. Forgy are the crew on the Atlantic Model 45.

Mr. D. L. Sommerville is the Pennsylvania

Railroad Company's engineer in charge, and J. M. Marshall is resident engineer on the section. John F. Casey, the president of the company, has even more than his usual keen interest in this work. Mr. S. L. Fuller, vice-president, is in charge of the operations of the company.

Straight Edge for Checking Slopes

Some time ago there appeared in *"California Highways"* a description of a straight edge, which many of our readers may find of use. The device consists of a straight edge on which are nailed cleats, so arranged that the angle between the straight edge and the cleats corresponds to the



slope desired. Each cleat is firmly fixed in place and marked with the corresponding slope. The straight edge illustrated is marked from top cleat to bottom cleat — 3/8 to 1 — 1/2 to 1 — 5/8 to 1 — 3/4 to 1 — 7/8 to 1 and 1 to 1.

In using the straight edge it is placed on the slope as shown, and the level put on one cleat after another until the cleat is found where the level indicates a horizontal position.

Did You Ever Dig With An Allosaur?

Those who make their living by the steam shovel, who are with it day after day, will probably be interested in the description of the machine which we give below.

The colorful description appeared in the *San Francisco Chronicle*, coming from the pen of Al. G. Waddell, who evidently admires the modern road-building machinery of today.

"Sinking its fangs deep and clamping its great jaws, the huge monster reared its head. There was a vicious growl, followed by a succession of grunts as the enormous brute wheeled around and vomited earth and stone into the waiting motor truck. The great animal snapped its jaws like an Allosaur licking its chops. There was a prolonged hissing, broken at intervals by wicked snorting, and again the fangs ground deep and the jaws locked.

"Three times the steel mastodon ground its teeth into the mountainside. Three times the huge mouth opened over the motor truck. Then, the truck was filled to overflowing with almost five yards of 'muck.'

"The monster rested for a period, throbbing with the joy of conquest and defiantly belching forth steam and smoke and fire. It was like mighty Moloch of the Amalekites, chuckling with glee."

We Never Thought It Would Be Necessary to Nail 'Em Down

From Florida comes the following clipping. We must admit that we never expected to see the report of the stealing of a steam shovel. It seems to be one thing which you ought to be able to find in the morning in the place you left it the night before. However, this is what we read from a clipping:

"SHOVEL STEALING MYSTERY SOLVED

"To Constable Crittenden goes the distinction of having solved the mystery of the largest and boldest robbery ever staged in Dade County.

"Yesterday he arrested Fred De Honey, of Coconut Grove, on the charge of stealing a mammoth 30-ton gasoline shovel from A. C. Hanna of Homestead. The machine was valued at $12,600.

"According to Crittenden, De Honey used a derrick to load the machine on a large trailer, and carted it from Homestead to Hialeah, where it was recovered. De Honey was released under $2,000 bond to await trial in criminal court on a grand larceny charge."

Blasting Helps Settle Swamp Fills

"In connection with meadow embankment, particularly across salt meadows, where an underlying crust is generally to be expected, the placement of the embankment and settlement can be greatly assisted if just prior to placing the fill the entire area on which the embankment is to be placed is broken up by dynamiting. In that manner the fill is permitted more readily and quickly to settle to a firm bottom. This operation can also be assisted by either excavating or dynamiting a ditch alongside the presumed toe of the embankment so as to permit the squeezing out of the under-strata without causing undue heaving of the surrounding meadow land outside the right-of-way line." — C. F. Bedwell, construction engineer, New Jersey State Highway Department, in *Engineering News-Record*.

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The Business Situation

While certain individuals have forecast a slowing of business for the end of this year, no tangible justification of such prophesies have appeared. There seems to be no excuse for pessimism. To be sure, some are not satisfied with the volume of business they are getting, but then there are always those in business and in industry who are never satisfied.

The watchword of all industry, construction, and manufacturing, is a constant search for methods which will increase efficiency and cut down costs. Business is constantly changing, and he who is able to most quickly adapt himself to the change will always be making money and always be in the fore. The mushroomlike growth of the radio industry has cut into the musical instrument business. The lumber makers are losing some business to the makers of cement, tile and artificial woods. Those manufacturers who see the change and adapt themselves most quickly to the new conditions will be the successful ones.

Buying has been generally conservative, and there are, today, large quantities of stocks held in most businesses, as has been the case for the past few years; there is every promise for continued easy money and no reason why a further readjustment should not take place without disturbance. A fact in point is the reassuring manner in which the Florida boom has quietly flattened out without generally serious consequences.

The amount of unemployed labor is extremely small at the present time, and the worker is being rewarded for what he does at rates which in terms of living costs are higher than ever before, and incidentally these living costs are becoming more stabilized.

The construction industry is situated very much as are manufacturers, except that this year has shown, until the last month or so, an unusual increase over last year. To be sure, the very unusual weather which continued into the middle of June has had a retarding effect upon the contractor's work as well as upon practically all manufacturing industries. Contract awards, however, are at about the same level as about a year ago, and actual letting of contracts shows a slight drop at the time this is written, from the same figure of a year ago. This still leaves building projects, however, at very high levels, and the situation, with costs very well stabilized and interest rates low, presents a very favorable aspect.

Examination of the steel industry points to a slightly lower rate of business since the first quarter. The figures, however, seem to indicate that practically no stocks are being carried. The profit sheets for the leading steel companies for the first quarter of 1926 show an unusually uniform increase over the figure for the same period last year.

There has been some feeling that automobile sales will show a decided dropping off within the next month or so. It is quite natural that during the latter part of the summer automobile sales should be reduced quite considerably. The seasonal changes of that industry are quite marked, and it should be remembered that in spite of the unusually unfavorable weather during the first part of this year the industry was very active. The General Motors Corporation show an earning of nearly thirty-five billion dollars, the largest ever reported by the corporation in any three months of its history, and a figure just about double for the first quarter of a year ago.

Over three-quarters of a list of some 115 miscellaneous industrial companies report increased earnings over 1925. These companies, which publish quarterly reports and whose figures are available, show that a large number of firms have made earnings in excess even of those in 1923, in spite of the fact that that year was until now the most prosperous since the War.

The textile industries have been particularly quiet, effected by the unusually bad weather and the extremely light buying by the retail trade, which has not given them active business in the past months.

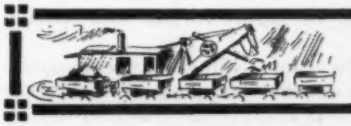
Railroad buying is apparently somewhat above that of 1925 and below that of 1924. The Imperial Bureau of Railway Economics calculates the probable expenditure of class for railways as between 750 million dollars and 800 million dollars.

The weather this year has been much less favorable to the spring wheat than it is in ordinary years, but in spite of that the total crop was estimated by the government on May 1 at 548,908,000,000 bushels, which figure, although it is slightly below the ten-year average, is 150,422,000 bushels greater than last year's crop. Corn has had rather a late start. The livestock

situation is the brightest spot in the agricultural situation.

One of the most heartening European events for some time has been the general strike in Great Britain. The outcome of this experiment on the part of the British Unions has done more to establish general confidence than anything that happened since the War. It has disposed of whatever fears there were that Bolshevism had secured a substantial foothold in England or western Europe. The Soviet authorities in Europe hailed the strike as the beginning of a revolution after their own pattern, and telegraphed a contribution of money in its support. The trade unions of England had no desire for revolution, and did not want to make over the functions of government. The Russian money was refused. When it became apparent where their policy was leading them, they abandoned the general strike. It is hoped that the coal situation will be cleared up very shortly, and that the British miner may eventually enjoy a level of living comparable to that enjoyed by the American workmen.

Although European conditions are a little confused compared with the general expectations of a year ago, they are not critical as they have been at times in the years since the War. Social discontent is no longer a menacing factor, and national animosities are not so obtrusive and threatening.



· FIELD NOTES ·

Re-Railing Aid

Breaking in or pounding down a new track over fresh fills and a soft roadbed with modern big equipment is conducive to numerous "spills." If one is trying to keep a shovel busy digging earth at the same time, something speedy is needed as a re-railing aid. The following method of using a pulling rope in conjunction with a re-railing frog, devised by George Leibig, pit foreman for the Cornwall Ore Bank Company, Cornwall, Pennsylvania, is described in *Engineering and Mining Journal.*

The rope may be cut from old hoisting rope, and should be about 1¼ inches in diameter and 25 feet long. Tie or clamp one end of the rope to a hook and the other to a coupling link. If tied, the first pull of the locomotive will make a never-slip knot. It is also easier and quicker to retie the rope than to change cable clamps if a tear occurs.

The section ahead of a derailed truck is uncoupled and the link end of the rope attached to this. The hook is caught in the truck frame back of the journal box on the side which will draw the wheels to the track. After the wheels are pulled close to the rails, the replacing frogs are used along with the rope. The side pull of the rope on the truck crowds the wheels to the rails and counteracts the overturning effect of a loaded car on the frogs.

Warped A frogs can be used and need not be blocked up or fastened to the ties. With trucks askew of the track on an extra hard pull, a second engine to shove may avoid a possible tear in the rope, and save time. Nearly any derailed car can be quickly replaced without unloading and with little damage to the track. Where a piece of track is giving trouble, the ropes are carried on the locomotives, and only 15 or 20 minutes are required as a rule for jobs that formerly took one-half to three hours.

Cleaning Machine Parts

When it is desired to clean machine parts which are gummy and dirty, try boiling them for 10 or 15 minutes in water, to which has been added a tablespoonful of caustic soda for each quart of water.

The caustic soda combines with the grease and forms a soap, which is readily dissolved in hot water, and the boiling washes this soap and dirt from the metal.

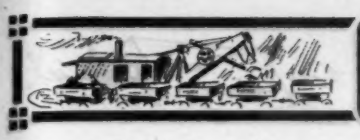
The boiling may be done over a fire, or a steam jet from a pipe or hose passed into the water will accomplish the result.

Thorough Lubrication Pays

After all the time and money that has been spent on lubricating devices and oils, it is not uncommon to find bearings running hot and gears running dry.

The operator of a machine can not afford to be careless in the matter of lubrication. Friction heats and wears the parts, and eats up power. When there is insufficient or improper lubrication, maintenance costs climb and production begins to drop. Careless lubrication strikes at the very heart of efficiency.

Careful and thorough lubrication saves power, saves fuel and fuel handling costs; the machinery is under less strain; there are fewer breakdowns and accidents; there is less lost time, and the whole business goes on with minimum depreciation and maximum production.



DEVICES YOU OUGHT TO KNOW ABOUT

A New 1-Yard Shovel Announced by Bucyrus Company

The *Bucyrus Company, South Milwaukee, Wisconsin,* has recently announced a new Bucyrus steam shovel, the 31-B. It is a one-yard, full-revolving shovel for contractors and general use.

Speaking of this new Bucyrus, Mr. G. A. Morison, Vice-President and Secretary of Bucyrus Company says:

"Close contact with shovel users in the field has shown that the excavating tool most in demand today is a one-yard shovel with very defi-

nite qualities; accordingly, we have built the 31-B to meet these conditions. The overall dimensions of the shovel are no greater than those of most ¾-yard shovels built today, but this new Bucyrus is a real 1-yard shovel, built from caterpillar track to boom sheave for work with a one-yard dipper. Thus built, the clearances of the shovel are such that it can manouver in and out of odd corners handily and work to advantage in extremely narrow cuts. The rear end radius is just 9 feet 6 inches. This with the strength for any sort of digging on any job that a small revolving shovel might be reasonably asked to do and the dipper capacity of one cubic yard will, we believe, make the 31-B a most efficient tool for general excavation.

"The standard machine is built to cut a wide level floor 16 feet 7 inches, dig 4 feet 11 inches below grade and dump 12 feet 6 inches above the floor level, either to spoil or in trucks. It has, of course, the abundant strength and power that has always characterized Bucyrus machinery.

"All of the proven Bucyrus features are retained in the design, which has been worked out in close co-operation with men in the field, including the outside dipper handle, the box girder boom, two-part hoist direct connected to dipper, unobstructed dipper opening, swing engine mounted in front, and Bucyrus caterpillars with big idlers and bearings high out of the mud, and the continuous treads with no gaps between links.

"The shovel is also available as a high-lift shovel of 1-yard capacity, dumping 18 feet above the floor, and extra high lift, ⅞-yard dipper, that reaches its extreme dumping height of 21 feet 7 inches.

"The 31-B is quickly and easily convertible to a dragline, with a 40-foot boom. It is also offered as a sewer excavator, clamshell or crane."

New Track Shifter Device

The Nordberg Manufacturing Company, Milwaukee, Wisconsin, have recently brought out a device for their track shifter which makes this machine especially applicable for ballasting work. This new device will permit raising the track level and holding it level when the required height

is reached, so that ballast may be shoveled under the ties and tamped. It permits a lift of about three feet. This device can be furnished for any track shifter already in the field, and permits the user of the machine to use it for either shifting or ballasting work.

SHOTS FROM THE · FIRING LINE ·

Central States Notes

Roy Edwards writes that he is stripping coal at Chelsea, Oklahoma, using a Bucyrus 80-B with a 48-foot boom, 30-foot sticks, and mounted on caterpillars. Mail will reach him addressed to Box 365.

The Pyramid Coal Corporation have put into operation a Bucyrus 320-B steam shovel mounted on caterpillars in their mine at Marion, Illinois. The upper view shows left to right: Lon Winn, mine superintendent, C. F. Hamilton, vice-president, A. E. Steiger, general manager, Albert Osborne, assistant mine superintendent.

The lower view gives an excellent idea of the large size caterpillars and the motor car back in under the base of the shovel.

Iowa Notes

BY H. C. EMERY

Clark Construction Company, Clinton, Iowa, were successful bidders on a drainage project near Waukon, Iowa. This job entails approximately 85,000 yards.

Jenner Brothers Construction Company, Davenport, Iowa, are progressing nicely on the road job near Princeton, Iowa.

F. L. Busche has just completed the basement excavation for the new Unity Building to be erected at 18th and Harvey Street, Omaha. Culley was at the levers of the Bucyrus 20-B gas, and the 6,000 yards was loaded into trucks in seven working days, some dirt moving, we say.

Callahan & Walker were awarded the contract to do the big ditch on the Papio project in Tarpy County, Nebraska. There is approximately a million yards in the job and Mark Walker plans to use his 3-T Monighan dragline. There were eight bidders on this job.

Missouri Notes

BY A. M. SHEFFER

Cook & O'Brien, Kansas City, Missouri, were awarded contract by the Santa Fe Railroad for fifty-six miles of new line in western Kansas and eastern Colorado.

It is reported that rapid progress is being made on the extension of the Santa Fe from Fairfax, Oklahoma.

The Rock Island, according to rumors, will call for bids in the near future for the proposed extension from Liberal, Kansas, to Amarillo, Texas.

Tibbetts & Tibbetts, Kansas City, Missouri, were awarded Federal Aid Road Project No. 299, Cherokee County, Kansas, 6½ miles grading, 80,000 yards earth excavation and 12,000 yards gravel surfacing.

New England States Notes

BY E. J. O'CONNOR

The Great Northern Paper Company of Bangor, Maine, have recently purchased an eight-wheel trailer to be used in the moving of small tugboats from one lake to another in the Moosehead section of Maine. The company is the owner of a Bucyrus 14-B purchased in 1916, which has given very satisfactory service in the constructing of over 250 miles of privately owned road.

Antona Pallotto has been awarded the contract for a four-mile stretch of road between Worcester and Lowell, Massachusetts. This is a link in a very important cut-off between New York City and the shore resorts of Maine.

Al Redcoy of Atlantic is now operating for P. J. McNamara of Brighton.

For use in the enlargement of his quarry, M. M. McDonough of Swampscott has installed a 1-yard McMyler.

Jos. McCormick & Sons of East Providence has just commenced work on a large road job in Norway, Maine. This is the home of Melline Durham, the fiddler.

The Lane Quarry of Westfield, Massachusetts, report a busy season. The additional road work in Massachusetts and the rock ballasting on the Boston and Albany has made a capacity of 3000 tons a day necessary.

The Lynn Sand and Stone Company, of which James "Jim" Cooke is the owner, are installing a new jaw crusher at their plant. They hope to increase their capacity about five hundred tons a day with this new machinery.

T. Stuart & Sons of Newton, Massachusetts, have about completed their dam job in Pottsville, Pennsylvania. They have a Bucyrus 20-B, 30-B and 50-B there.

T. J. Quinn of Ashton, Rhode Island, is working on a cut-off between Providence, Rhode Island, and Boston, Massachusetts, which will cut down the distance between these important cities about five miles.

The Okmulgee Transportation Co., Okmulgee, Okla., put a GMC to work January 1, 1924. During a period of 2 years and 5 months it ran *110,880 miles with the loss of only one day,* running 18 hours a day, 7 days a week. *That's reliability.*

These features insure unusual

Reliability

in GMC Trucks

The ability of GMC Trucks to haul their loads, day after day and year after year, *with a minimum loss of time* is the direct result of General Motors great engineering and manufacturing facilities, plus years of experience in truck building.

Improved wear-resisting, removable cylinder walls and positive high pressure lubrication to all bearing points in the engines; oversize transmission gears and shafts; oversize universal joints; oversize axles; pressed steel frames; springs of finer steel; electrical wires encased in wet-proof conduits:—

These are but a few of the reasons for the *unusual reliability* of General Motors Trucks.

GMC TRUCKS
PRODUCT OF GENERAL MOTORS

Sold and Serviced Everywhere by Branches, Distributors and Dealers of

GENERAL MOTORS TRUCK COMPANY
Pontiac, Michigan
A DIVISION OF YELLOW TRUCK AND COACH MANUFACTURING COMPANY

GMC 1, 1½ and 2½ ton trucks — GMC Big Brute 3½ and 5 ton trucks
GMC Big Brute 4 to 15 ton Tractor Trucks — Yellow Cabs — Yellow Coaches
Yellow Light Delivery Trucks — Herts Drivurself Cars

Co GMT Co—1926

SHOTS FROM THE FIRING LINE — Cont.

New York State Notes

BY T. A. BURNS

We wish to publicly thank E. L. Gaffney and Louis Diener, who recently called on us, for coming in about lunch time, the boss having taken us all to lunch.

We have heard that Mr. Montee Niesley of Great Neck, Long Island, formerly connected with various contracting concerns, has incorporated and started a general contracting business of his own.

It is reported that two well-known operators of Staten Island are thinking of starting in the excavating business on their own initiative. We do not mean to imply that they are going in business together, but we have heard that Dan Duffy and Al Swift are each thinking of doing so.

Albert D. Totora and Dominick Golia are entitled to special mention because of the manner in which they handled a Thew shovel owned by Fred Dedona of the Bronx.

The Fasano Company of Port Richmond, Staten Island, are on a very large rock job at 176th Street and Marion Avenue, Bronx.

Foster Vogt, with the help of James Siville, claims a record with Delain & Macchio's Bucyrus 20-B on a Joseph Day development known as Castle Hill in the Bronx. They are said to be loading twenty-five to thirty five-ton trucks in a 5-foot bank of pretty tough material every hour they have been on the job. Incidentally, they have been on the job about a week. T. Loton Keegan, for the firm of Ahearn & O'Connor, vouches for the count. There are other shovels on the job, but it is freely admitted that Vogt and Siville's record is never approached.

Among the progressive concerns making a specialty of rock work in New York is the Angelo & Collins Company. Mr. H. Collins is generally conceded to be one of the most efficient engineers in the business.

Erector Bigham of the Bucyrus Company is in the Movies! Yesterday at the American Venice Development along the Merrick Highway on the South Shore of Long Island, Victor Pisani, director of the Development Corporation, helped Mr. H. V. Findley, managing director of the Long Beach Dredging Corporation, install a new Bucyrus 50-B Diesel dragline, and in connection with the ceremonies motion pictures were taken by the Pathe News.

Bigham's job was to instruct and support a beautiful young lady of the movies in the seat and at the controls of the dragline while the pictures were being taken. He says he doesn't care how much footage is destroyed or how many retakes are necessary under such circumstances. He objects, however, to closeups and wonders if Pathe News is shown in Evansville.

R. B. Shelton is operating a Bucyrus 50-B Diesel for the Land Improvement Corporation of Port Washington. Pete Walter and John Goodman are cross shifting for Mr. Shelton and E. O. Taliaferro is the superintendent on the job. Billy Wilson is in supreme command.

Chris Rosenthal and John Raeding both now have new hats. We have now paid all the bets we can remember.

When you need a *Bucket*
it doesn't pay to use a *sieve*

Most likely you have seen some buckets spilling part of each load between the lips, on every trip —

and have wondered why such "sieve" buckets were allowed to stay on the pay-roll. For a bucket like that lets profits leak away.

You don't see WILLIAMS Buckets losing part of the load between the scoops.

The WILLIAMS Bucket's lips come right together, because the scoops are perfectly in line and *stay that way*. The big one-piece main hinge holds the scoops in perfect alignment, season after season.

Let us send you some photographs of WILLIAMS Buckets that have seen many years of service on work like yours, and are still acting like new buckets. Write us—

G. H. WILLIAMS COMPANY, 603 Hayburger Lane, Erie, Pa.
Branch Offices: New York, Pittsburgh, Chicago

WILLIAMS
FAST-DIGGING BUCKETS
All Parts Guaranteed Against Breakage

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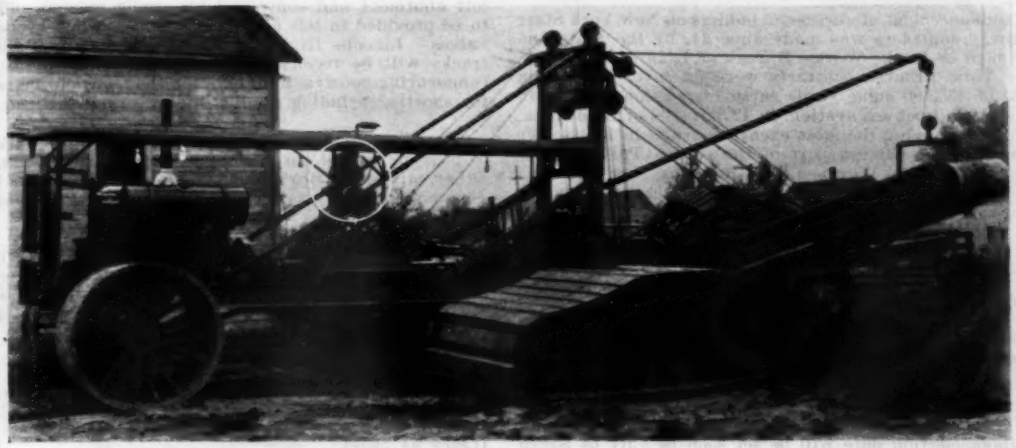


A 1500-watt Kohler Automatic Electric Plant (encircled) provides light for night work to this Buckeye Traction Ditcher.

Double the Earning Power per machine with a KOHLER Automatic Electric Plant

If you want to double the yearly earning power of your excavating or construction equipment, get a Kohler Automatic Electric Plant to supply electric light for night work.

By keeping your machines busy at night as well as by day, your present equipment will turn out twice the amount of work per year.

That means twice the income

— more jobs per machine per year
— better service
— lower "over-head" per job.

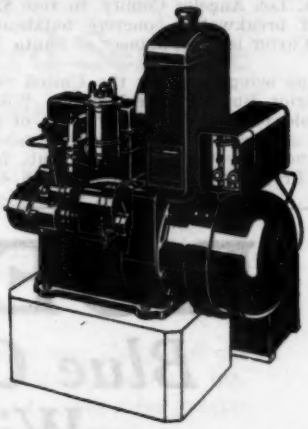
A Kohler Automatic Electric Plant used to light up night operations pays for itself many times over.

Write for complete information concerning this compact, sturdy, smooth-running electric generating unit, which supplies enough current to make the darkest night as light as day. Built in 800, 1500 and 2000-watt capacities.

KOHLER OF KOHLER

Kohler Co., *Founded 1873* Kohler, Wis.

Branches in Principal Cities



Kohler Automatic Model "D" 1500 Watts

SPECIFICATIONS

ENGINE — Valve-in-head, four cylinder, four cycle; 2" bore, 3" stroke, speed 1000 R. P. M.
HORSEPOWER (Gas Engine) — 3.
LUBRICATION — Pressure pump forcing strained oil to all main bearings, splash to other engine bearings.
COOLING — Water cooled, each cylinder entirely surrounded by water.
CONNECTING RODS, CAMSHAFT, CRANKSHAFT AND ROCKER ARMS — Drop forged, special steel, heat treated.
GOVERNOR — Mechanical throttling; proportions fuel used to load being carried.
STARTING BATTERY — Small battery of automobile type for starting only; kept automatically charged.
FUEL SUPPLY — Vacuum tank on plant; connected to 55-gallon main supply tank, to draw fuel for plant.
GENERATOR — Four-pole, compound wound, 110 volt D. C., 1500 watts.

SHOTS FROM THE FIRING LINE — Cont.

Announcement of successful bidders on New York State highway contracts was made June 11, by the State Department of Public Works, Bureau of Highways, Albany, New York. Eleven contracts were let involving a sum total of 433,480 cubic yards earth excavation and 22,515 cubic yards rock excavation, in 42.82 miles of road work. The job involving the most excavation was in Rensselaer County in the eastern part of the state. This contract went to S. B. Van Wagenen, Inc., Rondout, New York, the road being 5.52 miles long, and necessitates 180,000 cubic yards of unclassified excavation.

Pacific Coast Notes

BY P. H. BIRCKHEAD

Contract awarded to Grier & Mead, 593 Market Street, San Francisco, who bid $1,374,374 for construction of 18,000-foot Claremont Tunnel, horseshoe shape, 9-foot diameter, for the East Bay Municipal Utility District, Ray Building, Oakland. Refer to our issue of May 15th for unit and total bids received and quantities of work involved.

Bond election date will be set soon by City of Santa Monica, Los Angeles County, to vote $2,000,000 for 5900 feet of breakwater, concrete bulkheads and wharves. H. B. Carter is city engineer of Santa Monica.

Plans being made by the United States Department of Interior, Bureau of Reclamation, Wilda Building, Denver, Colorado, for the construction of the Echo Dam to create a reservoir for irrigation water on the Weber River near the town of Echo, Utah, for the Salt Lake Basin Project. Dam is to be earth embankment type, 125 feet high, containing 1,400,000 cubic yards earth and gravel fill. The outlet works will be in a tunnel in the left abutment and controlled by needle valves, spillway to be provided in left abutment and controlled by needle valves. Lincoln Highway and Union Pacific Railroad tracks will be reconstructed. Funds are available for commencing construction, bids for the works to be called for shortly, including grading highway and railroad.

Bonds voted $200,000 by the City of Santa Barbara, to pay one-half of the cost of a proposed breakwater of either caisson or riprap construction. $200,000 has been donated for the project by Major Max Fleischmann. E. E. Haskell is city manager of Santa Barbara.

Plans are being prepared by consulting engineer Thos. H. King, 920 8th Street, San Diego, for the construction of 90 miles of new canals and repairs to old canals for the Niland Water District, Niland, Imperial County. Bids for the work will probably be called for in the fall. Bonds voted $140,000, but have not yet been sold.

Granfield, Farrar & Carlin have started on the excavation for the new thirty-story Russ Building with their Bucyrus 20-B shovel, which is being handled by Red Haney as usual.

The Utah Construction Company has been awarded contract for excavation in connection with yard enlargements for the Southern Pacific Company, Klamath Falls, Oregon.

Pennsylvania Notes

BY T. H. BARRETT

J. Robert Bazley, Pottsville, stripping contractor, is starting a new stripping job for the Harleigh Brookwood Coal Company at Morea.

ROEBLING

Blue Center Steel Wire Rope

TRADE MARK JAR REG. U.S. PAT. OFF.

is especially adaptable to heavy duty, where heavily applied loads and sudden stresses tax the rope to utmost strength.

For Dredging

this rope excels all others for durability, uniformity and toughness.

John A. Roebling's Sons Co.

TRENTON, NEW JERSEY

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Twenty-Two Years of Hard Service

—*But the Shay's Resale Value Was High!*

FOR twenty-two years, a Shay Geared Locomotive was in service at a southern operation.

Through this long period of service, the Shay rendered dependable, economical performance, to the complete satisfaction of its owners.

Just a short time ago, this Shay was sold, and the company writes, "at a very attractive price for a machine of this age. A Shay seems to have a far greater resale value than any other geared engine."

When you are considering the selection of a new locomotive, remember that the Shay is a dependable, long-serving hauling unit with an unusually low rate of depreciation. Write for a copy of the Shay catalog.

The Shay Industrial Catalog will tell you what Shays are doing under conditions similar to yours. Write for a copy.

LIMA LOCOMOTIVE WORKS

Incorporated

Lima, Ohio — 17 East 42nd St., New York

LIMA
Shay Geared **LOCOMOTIVES**

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SHOTS FROM THE FIRING LINE — Cont.

Mike Reilly of Bethlehem, Pennsylvania, is running a Bucyrus 50-B steam shovel for T. Stuart & Sons on their job at Indian Run Dam, Pottsville, Pennsylvania. F. Dunlevy is running the Bucyrus 30-B on the same job. It is expected that the job will be completed this fall.

J. W. Boyle of Freeland has taken over the job and equipment of J. Kehoe at Honey Brook. He has added new equipment and expects to get increased yardage.

The Lackawanna Valley Fuel Company of Scranton are stripping a section of their property near Childs, Lackawanna County, Pennsylvania.

Miscellaneous Notes

J. W. Holler of Fort Edward, New York, has been awarded a contract for a breakwater on Lake Geneva, New York.

S. J. Groves & Sons are completing a viaduct at South Camden, New Jersey.

The U. G. I. Contracting Company, Philadelphia, are starting work on a dam in the Housatonic River near Bridgeport, Connecticut.

Southern States Notes

BY W. W. WHORLEY

W. S. Gann is operating a Bucyrus 70-C for G. L. Mays at Calcis, Alabama, for a short while.

Ed Esrael is back at the levers again following an operation and spell in the hospital.

The Alabama State Highway Department awarded contracts on several nice jobs the latter part of May as follows: Dallas County, three miles gravel road to C. P. Cosby, Selma, Alabama; Macon County, 13.8 miles gravel road to Newell Contracting Company, Birmingham: Monroe County, 17.5 miles of gravel highway to Newell Contracting Company, Birmingham; Pickens County, 13.8 miles gravel road to Finnell & Toothaker, Tuscaloosa, Alabama; Limestone County, 1.7 miles approaches to Tennessee River Bridge to McWhorter & Gilbert, Birmingham; Cullman County, 18.3 miles of Bee-Line Highway to J. B. Turner, Columbiana, Alabama; Winston County, 12 miles to L. C. Britton & Kilgore, Jasper, Alabama.

The Signal Mountain Portland Cement Co. has a Bucyrus 50-B steam shovel handling blasted limestone in their quarry near Chattanooga. John Fenton and John Park are operator and fireman.

TAYLOR MESABA

STEAM SHOVEL CHAIN IS CONSTANTLY WINNING AND HOLDING GOOD WILL

Actual yardage records kept by hundreds of quarries, mines and contractors conclusively prove that while the first cost of Taylor-Mesaba Chain may be a trifle higher over a period of time it is by far the cheapest.

"BEST BY TEST"

S. G. Taylor Chain Co.
(Established 1873)
502 Marquette Building
CHICAGO, ILL.

Supreme for Road Work

Cletrac
Crawler Tractors

WHETHER for breaking out new highways under hardest possible conditions — or for the heavy, steady jobs of road maintenance — Model "K" Cletrac never fails to effect remarkable savings and deliver unfaltering service. Here is a road-building tractor of amazing power, outstanding economy and remarkable ease of handling.

The short turning radius of Model "K" Cletrac (within its own length) — its low-hung weight — positive traction over any footing — and wealth of power make it the ideal power unit for all road jobs.

"Snap" Lubrication

Cletrac K is the only tractor made with "Snap" lubrication. At the push of a plunger — without stopping the machine — the lower track wheels are thoroughly oiled.

For low cost operation — downright satisfaction — and a tractor of lasting quality you want Model "K" Cletrac. Write today for descriptive literature, prices and full information.

The Cleveland Tractor Co.

Cleveland, Ohio

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SHOTS FROM THE FIRING LINE — Cont.

P. F. Burke writes us that he is pulling the levers on a Bucyrus 70-C for the Brooks Callaway Company at Rockmart, Georgia.

Ed. Johnson and E. W. Manning are running Erie whirlies for the Simpson County Gravel Company at Mount Olive, Mississippi. Ansie Sullivan is dinkey man on this job.

John Hooper is loading clay with a Bucyrus 30-B for the Hermitage Portland Cement Company at Nashville, Tennessee.

Dave Brown is using his Bucyrus 20-B to dig the foundation for the new Chattanooga Savings Bank Building in Chattanooga, Tennessee. L. V. Barber is operating the 20-B.

W. B. Cummings is stripping coal with a Bucyrus 175-B for the Kershaw Mining Company at Cedrom, Ala.

St. Louis Items

BY A. B. KOENIG

John Marsch was with us a day. He reports his four shovel jobs on the Illinois Central Railroad making rapid progress. He also reports several steam shovel outfits, locomotives and 75 twelve and sixteen-yard cars idle that he can place on work immediately. His address is 1307 Wrightwood Avenue, Chicago, Illinois.

Contract for the paving of several miles of State Route 31, between Duncan Mills and Astoria, in Fulton County, Illinois, was awarded by the State Division of Highways to Kerr & Murphy, Bloomington, Indiana, on its bid of $163,955. Two other contracts awarded were: Paving Section 16, Route 3, Whiteside County, to J. L. Wells Company, Rock Island, $42,402; Paving Section 53, Route 2, De Witt County, Ernest Berns and Company, Indianapolis, $110,374.

Gierke & Cleland want work for machine outfit that is idle at Dana, Illinois.

Flick Construction Co. are finishing their Illinois Central work in Southern Illinois.

The Hannibal Construction Co. were awarded contract for 8 blocks of paving in North Mexico, Missouri. Their bid was $36,971.77.

Shugart & Blythe were awarded contract for reservoir at Thompsonville, Illinois, by the Illinois Central Railroad Co. This firm reports several good team and grading outfits idle at Farina, Illinois.

F. B. Ingersoll of the Ingersoll-Stauffer Engineering Co., Marshalltown, Iowa, was with us a day. They are putting in the concrete and masonry for the new Illinois Central Railroad at Thompsonville, Illinois.

Harvey Brown of North Little Rock, Arkansas, was awarded concrete paving contract in England, Arkansas.

C. V. Burghart, vice-president and treasurer of Bates & Rogers Construction Co., took a run down to St. Louis to look over things in this part of the country.

C. H. Atkinson Paving Co. of Watertown, South Dakota, were awarded contracts for 13.7 miles of concrete paving in Boone County, Missouri, also 13.6 miles of concrete paving in Randolph County, Missouri.

Locomotive Type Boilers
for
Asphalt Plants

Small sizes for portable service. Large sizes for car plants or stationary service. Coal or oil fuels.

Designed with a knowledge of your requirements, based on extensive experience in this line.

JOHNSTON BROS., Inc.
Specializing in Boilers for Contractors' Equipment
FERRYSBURG, MICHIGAN

MAKERS OF POWDERS SINCE 1802

The quickest means of transmitting intelligence when the first du Pont powder was made

Safety—

The safety factor in the manufacture and use of explosives has been developed through exacting control and uniformity of product.

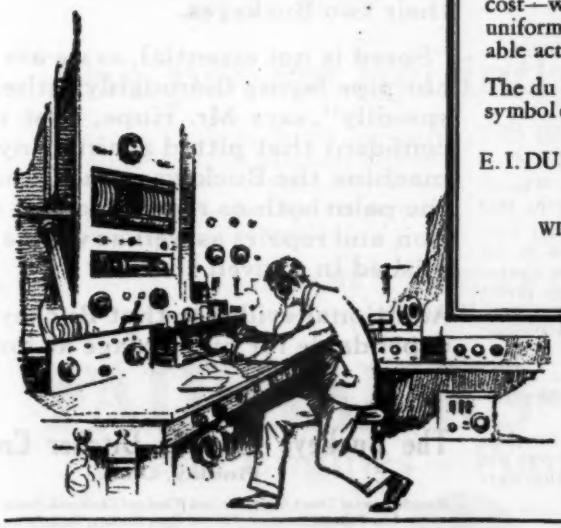
Nearly a century and a quarter of experience enables du Pont to render industry a notable service in the reduction of blasting hazard.

Du Pont explosives give better blasting results at lower ultimate cost—with safety—because of their uniformity, stability and dependable action.

The du Pont oval trade-mark is the symbol of modern explosives service.

E. I. DU PONT DE NEMOURS & CO.
INCORPORATED
Explosives Department
WILMINGTON, DELAWARE

DU PONT



Radio apparatus is fabricated from materials extracted by explosives power

123 YEARS OF LEADERSHIP IN THE SERVICE OF INDUSTRY

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SHOTS FROM THE FIRING LINE — Cont.

Winston Bros. Co. completed their steam shovel contract on the Belmont branch of Missouri Pacific Railroad in record time. This firm has three shovel outfits and three track gangs at work on the Missouri Pacific Railroad, between St. Louis and Jefferson City, Missouri, double-track construction.

W. A. Ross Construction Co. was awarded contract for 0.492 miles of concrete road work 18 feet wide in Lincoln County, Missouri.

Cook & O'Brien Construction Co. were awarded 4.5 miles of concrete road work in Pettis County, Missouri.

V. E. Koch has contract for 2.4 miles of concrete road work in Jasper County, Missouri.

The Kancher-Hodges Construction Co. of Memphis, Tennessee, were awarded contract for construction of the Helena, Arkansas, river terminals. Their bid was $210,097.20. Contractors are given four months to complete the job. The terminals when completed will cost $400,000.

Contract for the paving of Section 49, Route 3, Greene County, Illinois, was awarded by the State Division of Highways to the Nelson Construction Co., Jerseyville, Illinois, on its bid of $24,939.58. Other contracts awarded were: Paving of Section 73X, Route 2, and Section 22X, Route 18, both in La Salle County, Henry Zolpher & Sons, Mendota, Illinois, $14,850; Paving Section 15W, Route 1, Lawrence County, Daniel E. Alumbough, Sullivan, Indiana, $14,004; Paving Section 16X, Route 25, Coles County, James and Shinn Co., Mattoon, $2,520.

The M. L. Flinn Paving Co. of Sioux City, Iowa, are low bidders on two of the largest paving jobs let by the city of St. Louis for some time.

Woods Bros. Construction Co. are low bidders on 1,750 feet of revetment work in Dast Bottoms near Klondike, Missouri, on Missouri River.

The Tyner Construction Co. started work on their concrete paving contract near Butler, Missouri.

W. F. Sherbing came in from Honey Creek, Wisconsin, trying to scout up a job for a machine outfit that he has idle.

Allhands & Davis have their bridge filling job on the Frisco Railroad and their bank widening on the Cotton Belt Railroad in southern Missouri and Arkansas pretty well covered with stationmen. They have some work suitable for small team outfits. Address them at Weiner, Arkansas.

The Carmichael-Cryder Co. are constructing a new double-track bridge for the Wabash Railroad at Decatur, Illinois.

Contractors when in want of work or labor for their outfits write, wire or phone Koenig Labor Agency, 612 Walnut Street, St. Louis, Missouri, or 501 Delaware Street, Kansas City, Missouri.

John Marsch, Inc., were awarded contract for cut-off and grade reduction near Ava, Illinois, by the Mobile & Ohio Railroad.

Bob Shirley has two machine outfits at work on the Rock Island double-track work near McFarland, Kansas, and one at Paris, Missouri, on state highway work.

The Buckeye was Better "in Power and Huskiness"

"The Buckeye Traction Ditcher Company's bid was the lowest and probably the best in view of the fact that they conformed to the requirements of depth and width of trench with a machine whose power and huskiness of build was slightly better."

So writes Mr. A. L. Hupe, Assistant Engineer, of the Louisville (Ky.) Water Company, to a party inquiring about their two Buckeyes.

"Speed is not essential, as we are doing our pipe laying thoroughly rather than speedily", says Mr. Hupe, "yet we are confident that pitted against any other machine the Buckeyes would carry off the palm both as regards cost of operation and repairs as well as work accomplished in a given time."

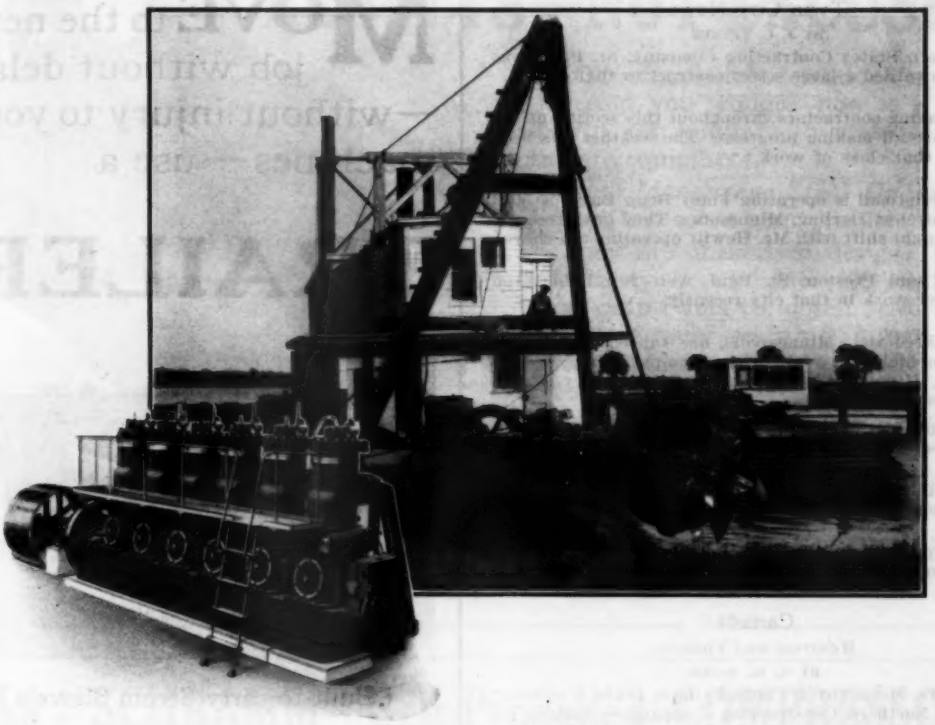
Additional evidence that Buckeyes are dependable for big yardage at low cost.

The Buckeye Traction Ditcher Company
Findlay, Ohio

Manufacturers of Trench Excavators (both Wheel and Chain-and-Bucket Types), Pipe Line Trench Excavators, Tile and Open Ditchers, Back-Fillers, Pipe Screwing Machines, Curb Diggers and Clay Diggers.

THERE'S A BUCKEYE SALES AND SERVICE OFFICE NEAR YOU

BUILDERS OF TRENCH EXCAVATORS FOR OVER 10 YEARS



The power behind "Progress"

"Progress," built to be the *last word* in suction dredges, naturally depends for power upon a Fairbanks-Morse Diesel engine — the ideal power for dredge and dragline service.

This large suction dredge, owned by F. A. Root, of Daytona Beach, Florida, pumps from 2000 to 2200 cubic feet of material through 1400 feet of pipe line every nine hours.

FAIRBANKS, MORSE & CO., Chicago

28 branches throughout the United States at your service

FAIRBANKS-MORSE

Diesel Engines - Pumps - Motors

AOA12.3—2050

For convenience in making inquiry use postal inserted in this number.

SHOTS FROM THE FIRING LINE — Cont.

Twin City News

BY J. C. YETTER

Northern States Contracting Company, St. Paul, was recently awarded a large sewer contract in that city.

The paving contractors throughout this section of the country are all making progress. The weather has been ideal for that class of work.

Mr. Chaptman is operating Foley Bros. Bucyrus 50-B Diesel shovel at Darling, Minnesota. They have recently put on a night shift with Mr. Hewitt operating the shovel.

O'Neil and Preston, St. Paul, were low bidders on some sewer work in that city recently.

T. J. Frederick, Minneapolis, has subbed most of his Wisconsin highway work to the Campbell Construction Company, Minneapolis, and Thomas and Kinney, Foley, Minnesota.

Operator Mr. Riley is pulling the levers on a Bucyrus 20-B Diesel shovel at Hackensack, Minnesota.

Thornton Bros., St. Paul, have recently been awarded a large sewer contract in St. Paul.

Barnard and Curtis, Minneapolis, Minnesota, report suitable progress on their drainage work in Ohio and Iowa.

Canada

Montreal and Vicinity

BY J. M. WARD

Walters, McCarthy & Company have taken a contract from the Northern Construction Company to furnish between 200,000 and 300,000 yards of rock. This is to be used for the filling of cribs on the new wharves in Quebec.

It is expected that greater activity will be shown around Quebec City where two new pulp mills are to be erected, one by the Anglo Canadian Pulp & Paper Company, and the other by the St. Regis Paper Company.

The Leaside Engineering Co., in which Mr. E. A. Wallberg was interested, recently purchased the rights of 1000 miles of timber limit from the Provincial Government. These have now been transferred to the International Paper Company. A new pulp mill will be erected, and thirty miles of railroad is to be constructed.

We had a visit from M. H. McManus and A. Finlayson of Halifax.

The International Paper Company are going to build seven miles of highway road to their plant at Chelsea.

H. F. McLean, who is connected with the Dominion Construction Co. and the Grenville Crushed Rock Co., has taken a contract for six or seven miles of railroad from the International Paper Company at Chelsea.

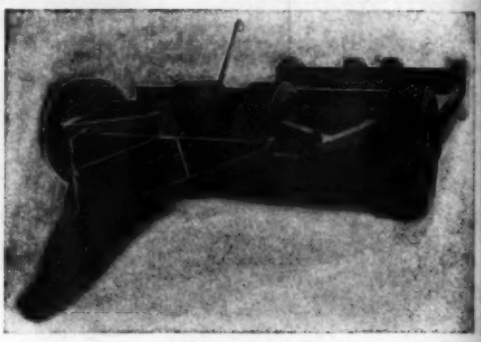
Toronto and Vicinity

BY C. F. ENGLAND

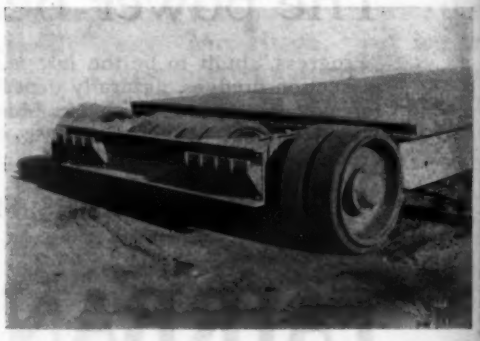
Frankel Bros. have the contract for dismantling the York Street Bridge, Toronto. This is in connection with the new viaduct scheme.

MOVE to the next job without delay —without injury to your machines — use a

TRAILER



(Built to carry Steam Shovels)



(Rear end construction for end loading)

BUCYRUS COMPANY
SPECIALTY DEPARTMENT
SOUTH MILWAUKEE, WIS., U. S. A.

RESULTS—NOT EXCUSES

HOW often is this demanded of you? And you wonder how it is possible to get results with makeshift or obsolete equipment.

Tisco Manganese Steel One-Piece Dippers will solve your problem.

They are of modern design. Rugged, sturdy, dependable. No joints to warp. No rivets to loosen. Made of the finest wear-resisting metal ever developed and equipped with Van Port Reversible Teeth.

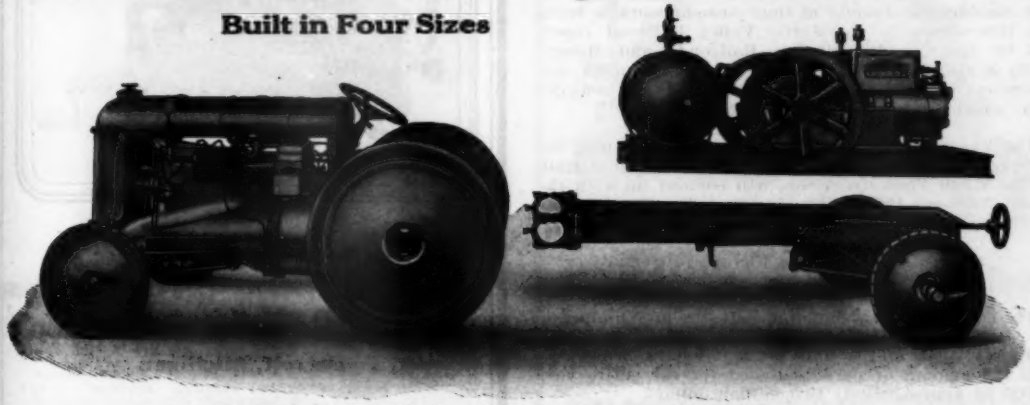
A Dipper You Will Be Proud Of.

Ask the shovel maker or write us direct.

TAYLOR-WHARTON IRON & STEEL COMPANY
High Bridge, New Jersey

The "SCHRAMM" Self-Propelled COMPRESSOR

Built in Four Sizes



Showing Compressor and Trailer and How Easy It Is to Couple Same to Tractor.

Write for 1926 Catalog and Details of Free Demonstration

SCHRAMM, Inc.
Main Office and Factory: West Chester, Pa.

54 Dey Street, New York
549 W. Washington Street, Chicago
331 Fourth Avenue, Pittsburgh
709 Arch Street, Philadelphia

For convenience in making inquiry use postal inserted in this number.

SHOTS FROM THE FIRING LINE — Cont.

Parklap, Incorporated, are going ahead nicely on the new Toronto Terminals Warehouse. Whitney Bros. Co. are driving the piles on this job.

Anglin-Norcross, Limited, have started work on the new engine and car building for the Canadian National Railways at the foot of John Street, Toronto. The Canadian McArthur Concrete Pile Company are driving the piles.

J. P. Porter & Sons have started their Bucyrus 225-B electric dragline on their work on Section Six, Welland Ship Canal.

Several contracts have been awarded in connection with the North Toronto sewer scheme; these cover mostly tunnel work. Some of the successful bidders are: John McGuire Contracting Co., Limited; J. H. McKnight Construction Co., Limited; Nelson River Construction, Limited; W. R. Worthington Construction Company and Connelly & Agnew.

Vancouver and Vicinity

BY J. C. MOON

The Georgia Construction Co., Ltd., of Vancouver, British Columbia, have secured the contract for clearing and grading a cut-off on the Pacific Great Eastern Railway; this cut-off will result in cutting out several bad curves, and also eliminating the highest wooden trestle on the line. The excavation amounts to approximately 342,000 cubic yards. This is likely to be the commencement of a good deal of similar improvement work along this line.

It is rumored that the Canadian National Railways are likely to come to an arrangement with a local syndicate under which a large up-to-date hotel will be built and leased by the railway; the cost of the building is estimated at $5,000,000 and an excellent site has been secured.

A considerable amount of improvement work is being done this season by the Kettle Valley Railroad (operated by the Canadian Pacific Railroad) and Messrs. Griffin & Co., Ltd., of Penticton, British Columbia, are understood to have secured a contract for this season's work, which covers some grading work, etc.

The Vancouver Harbor Commissioners are calling for tenders for grading the portion of their Terminal Railway in North Vancouver; this will connect up with the Second Narrows Bridge, Pacific Great Eastern Railway and the waterfront trackage in Vancouver.

Winnipeg and Vicinity

BY F. X. AMOSS

The condition of the building industry in Winnipeg is very gratifying. Local permits to the middle of May total nearly six and a half million dollars, which exceeds the amount of permits issued for the entire year of 1925 by approximately two million dollars.

The spring building includes The Hudson Bay Store Building, ten important apartment blocks, two printing plants, two church buildings, two schools, three hospital additions, several warehouses, besides alterations to many stores and office buildings.

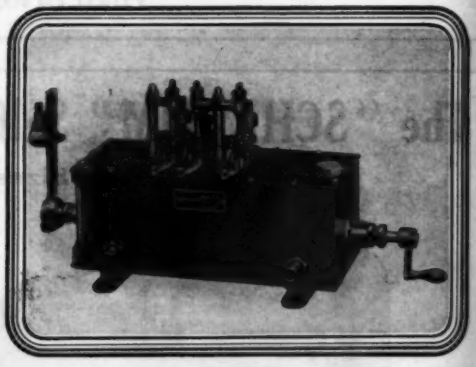
The Canadian Pacific Railway Company have let contracts for three branch lines to W. A. Dutton, J. Stewart and J. A. Sandgreen respectively.

A McCord Force Feed Lubricator Will Keep Your Shovel on the Job

A McCord force feed lubricator installed on your steam shovel now will insure more continuous operation. Dependable force feed lubrication prevents shutdowns and delays, it gives more hours on the job.

McCord force feed lubricators are used as standard equipment by the largest and best-known steam shovel builders and they will be installed on any shovel at your request.

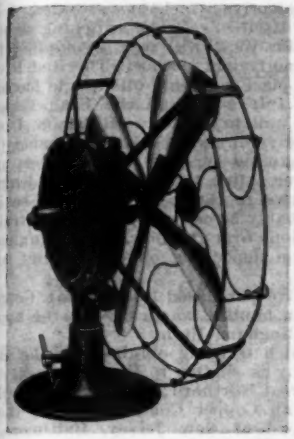
Put a McCord lubricator on now and be assured of dependable lubrication for the life of your shovel.



McCord Class B. A. Force Feed Lubricator

McCord Radiator & Mfg. Co.
Detroit, Michigan

McCord
force feed
Lubricators



This Steam-Driven Fan

Mounted on your shovel or dragline will make hot days cooler for your operator, will drive away flies, mosquitoes, etc. This will mean greater comfort, greater yardage, and in the end—
GREATER PROFITS.

This fan will operate on air on Diesel machines.

BUCYRUS COMPANY
SPECIALTY DEPARTMENT
SOUTH MILWAUKEE, WIS., U. S. A.

THE NORDBERG PATENTED TRACK SHIFTER

The Modern Way to Shift Track

Moving track frequently by the old-time hand methods is slow and costly. This machine with its one operator and a few laborers will replace that expensive track crew and shift four times the amount of track. Track jacks or bars are not needed when the Track Shifter is used. No investment in machinery can show greater results in decreasing costs and increasing profits.

Write for Bulletin GR-8.

NORDBERG MFG. CO., Milwaukee, Wis.

NORDBERG

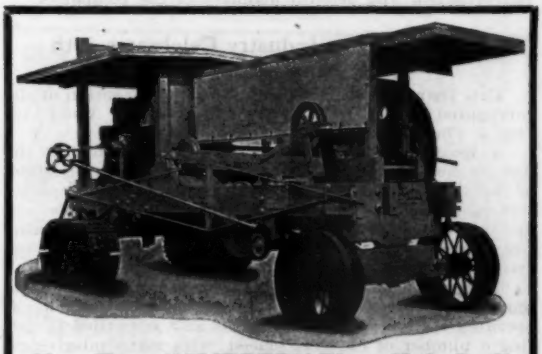
TWIN CITY
Portable Power Unit

A sturdy, compact, easily transported outfit, built complete in our own shops. Equipped with TWIN CITY Engine. Manufactured in sizes 35 to 140 H. P.

TWIN CITY Engines can also be bought separately for Heavy Duty Stationary, Portable and Traction Outfits. Specify them on your equipment. Write for literature and specifications.

Minneapolis Steel & Machinery Company
Minneapolis, Minn.
Heavy Duty Engine Manufacturers Since 1903

"BUILT TO DO THE WORK"



New Type "CLIPPER" Blast Hole Drill in Crawler or Round Wheel

The First Crawler Blast Hole Drill ever produced! Has proven an unqualified success.

When equipped with 40 H. P. gasoline engine for soft and excessively bad moving it gives a unit that shoves right through.

The "CLIPPER" is known among users as THE DRILL THAT DRILLS. One of the reasons it predominates.

The Loomis Machine Company
(Established 1847)
K Street, Tiffin, Ohio

SHOTS FROM THE FIRING LINE — Cont.

Mr. Albert McKay, who has spent the past few months in Florida, has returned home. He tells us he had an opportunity of handling the levers of some Bucyrus Diesel machines during his visit and is most enthusiastic about them.

Work on the paper mill of the Manitoba Pulp and Paper Co. at Pine Falls is proceeding very satisfactorily, and this new industry will in a few months be well established in the province.

A. McBeth is driving the Bucyrus 35-B shovel for Carter-Halls-Aldinger on their contract for new dyke for Manitoba Power Co.

The Provincial Government of Manitoba is doing a considerable amount of drainage work this year, and the three prairie provinces of Manitoba, Saskatchewan and Alberta are vigorously pursuing their good roads work, contracts for which have already been let.

TRADE NOTES

The *S. G. Taylor Chain Company, 140 South Dearborn Street, Chicago, Illinois,* have issued a revised general catalog, which contains complete data to safe loads on Double Sling Chains when used at various angles.

Westinghouse Promotes Seybold

Roscoe Seybold, formerly manager of price statistics of the Westinghouse Electric and Manufacturing Company, has been appointed assistant to F. A. Merrick, vice-president and general manager of the company.

Armco Culvert Industry Celebrates 30th Anniversary

This year the 30th anniversary of the invention of the corrugated culvert is being celebrated by the Armo Culvert & Flume Manufacturers' Association.

A feature of the celebration is the display in the Association's research laboratory at Middletown, Ohio, of the first corrugated culvert ever made. This culvert was manufactured by the inventor, James H. Watson, and placed early in 1896 under a public highway near Crawfordsville, Indiana, from which location it was recently removed for exhibition purposes.

Thirty years ago James H. Watson and his immediate successor, W. Q. O'Neall, conducted a small hand-operated factory at Crawfordsville and succeeded in getting a number of culverts placed, with many misgivings, under nearby roads. Today the Armco culvert industry operates more than thirty thoroughly modern and efficient plants, has a world-wide organization, and its culverts are found in practically every corner of the globe.

Back Gearing for General Electric Motors

A back-geared attachment designed to operate under the most unfavorable conditions, is announced by the *General Electric Company* for use with its "500 series" induction motors. This attachment is of unusually strong construction, is easily installed and easily adjusted.

The base, to which the motor and back shaft pedestals are bolted and doweled, is a single, large casting. A special unit-type pedestal is used, one casting forming the housings for the large back shaft bearings. Thus maximum rigidity and permanent, correct alignment of shafts, and meshing of gear and pinion, are assured.

Oil-Electric Locomotive Invades Another Field

The oil-electric locomotive which has established an enviable reputation for itself in railroad switching service in the East and Middle West will now be applied to industrial and short-line freight service. The Red River Lumber Company will place a 100-ton oil-electric locomotive in service about July 15th, and the Utah Copper Co. will place a 60-ton unit in service at Bingham, Utah.

The 100-ton locomotive of the Red River Lumber Co. will be employed in hauling logs out of the woods and hauling supplies in over a line 15 to 20 miles in length. Maximum grades of two to three per cent will be encountered. It will probably be necessary to cut the trains and take them in sections over these grades, the number of cars in each section depending on the amount and length of the grade.

The 60-ton locomotive purchased by the Utah Copper Co. will be employed in hauling waste cars on the upper levels at its mine at Bingham, Utah.

The locomotive which is being obtained by the Red River Lumber Company is similar to those of the Long Island Railroad and Great Northern Railway; the smaller locomotive for the Utah Copper Company is like those of the Central Railroad of New Jersey, Baltimore & Ohio, Lehigh Valley, Chicago & Northwestern, Reading, Erie, and Delaware, Lackawanna and Western railroads. In addition to those 60 and 100-ton units, larger oil-electric locomotives are being constructed for the New York Central Railroad.

A miniature catalog illustrating and describing the complete line of Milburn welding and cutting equipment has been recently issued by *The Alexander Milburn Company, 1416-1428 West Baltimore Street, Baltimore, Maryland.* Copy of this booklet may be obtained upon addressing the above manufacturer.

Frank T. Sheets, chief state highway engineer of Illinois, has made announcement of his association on May 1, 1926, in an advisory and consulting capacity with the firm of Barker, Flavin, Sheets and Wallace, Inc., Engineers, 1913 Burnham Building, Chicago, Illinois.

Where the Asbestos Goes

Asbestos producers owe their fortunes largely to the automobiles. Autos take 50 per cent of asbestos products. The annual consumption of asbestos brake lining is estimated at 70,000,000 feet.

Reforestation

Railroads, the largest users of treated timber, have planted 15,007 acres of forest land, which is about 1 per cent of the total forest planting in the United States.

Meeting Place of Capital and Labor

THE

KOENIG LABOR AGENCIES

Established 1875

ST. LOUIS
612 Walnut Street
Main 2766 and 2767

KANSAS CITY
501 Delaware St.
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Help of All Kinds Furnished Free

REVIEW OF BOOKS and CATALOGS | We shall be glad to review, in this column, such books and catalogs as are sent to us.

ARC WELDING IN GENERAL ELECTRIC FACTORIES — 8 x 10½ inches, 28 pages and cover. This bulletin illustrates and describes various sources of arc welding done in the General Electric factories. A copy may be obtained upon addressing the *General Electric Company, Schenectady, New York.*

AMERICAN RAILWAY ENGINEERING ASSOCIATION CULVERT LOAD DETERMINATION — 6 x 9 inches, 36 pages and cover. Illustrated. Contains a report of Railway Committee on an investigation into the loads acting upon railway culverts of various types. Copies may be obtained upon writing the *Armco Culvert & Flume Manufacturers Association, Middletown, Ohio.*

HANDBOOK FOR WIRE ROPE USERS — 88 pages, illustrated. The handbook contains very important information regarding the many usages of wire rope. A copy may be obtained upon application to the *American Cable Company, 215 North Michigan Avenue, Chicago, Illinois.*

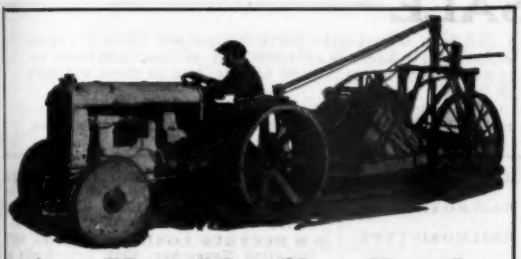
France to Enlarge the Ourcq Canal

The Council General of the Department of Seine has voted a credit of 11,800,000 francs for enlarging the Ourcq Canal as it enters Paris.

DIGGING - CLEANING CANALS AT LOW COST

THE NEW RUTH WITH ITS CONTINUOUS FLOW OF DIRT will dig or clean canals and trenches at a minimum cost per cubic yard or lineal foot heretofore considered impossible. The Ruth cuts continuous even banks and smooth bottoms. Working successfully in marshy or dry ground, or canals full of water. The Ruth positively cleans the canal of all muck, sand, small willows, tules and water grasses. **Send for Bulletin No. 8**—it illustrates the New Ruth Dredger; type and size of canals it will dig or clean; gives specifications, operating costs and maximum capacities.

RUTH DREDGER SALES CORPORATION
BOX A, HUNTINGTON PARK, LOS ANGELES, CAL., U. S. A.



Are You Hauling Earth or Dragging It?

Your dirt moving estimates are based on the amount of yardage delivered at the dump. Equipment that will deliver more earth and make more trips per day without loss and with the same operating expense, will give you greater profit. To this you must agree.

The Miami One-Man Power Scraper delivers twice the yardage of drag type scrapers, because the scoop pan is elevated in front and carries the load on roller bearing wheels, reducing drawbar pull on tractor, increasing the operating speed and allowing more trips per day. No earth is lost in transporting.

More than a thousand machines in satisfactory service, daily cutting dirt moving costs. Your additional profit of $8 to $10 per day starts when you put a Miami on the job.

Complete details of construction and operating costs mailed promptly upon request.

Distributors located in every section of the United States.

The Miami Trailer-Scraper Co.
603 South Clay Street Troy, Ohio

MIAMI -one man- -power- SCRAPER
REG. U. S. PAT. OFF.

See that your grease cups are filled with ALBANY GREASE

Being a thorough lubricant, Albany Grease keeps the bearings cool, prevents overheating and scoring even when sudden and unusually heavy loads are put on the bearings. Never drips. Sold in cans and barrels—all consistencies.

Demand Albany Grease, refuse substitutes—look for the trade mark. If your dealer cannot supply you, write us.

ALBANY GREASE
ADAM COOK'S SONS, Inc. 6 Varick Street, New York

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ONE PRINCIPLE FOR TWENTY YEARS

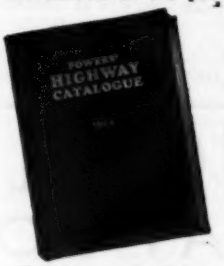
PITTSBURGH In speaking of Balanced Door Dump Cars, one of the nation's great operators said, "I doubt if a better principle for designing dump cars will ever be discovered." Careful buyers realize the years of underlying development work which have produced different equipments for their consideration. When one of these is based on a better principle than the rest, it is probably more economical to buy.

CLARK CAR COMPANY
BALANCED DOOR DUMP CARS
PITTSBURGH, PA.

San Francisco Rialto Bldg. | Chicago Peoples Gas Bldg. | New York 52 Vanderbilt Ave. | Boston 683 Atlantic Ave.

POWERS'
HIGHWAY
CATALOGUE

Presents in a single volume condensed catalogue information of the products of leading manufacturers of machinery, equipment and materials used in the construction of highways, city streets, bridges, sewers, railroads and general excavating operations.



Over 1,500 manufacturers or producers listed under more than 700 headings and cross references.

Third annual edition now ready for distribution among contractors, engineers and officials interested. To secure free copy send name and address and state business in which engaged.

E. L. Powers Catalogue Co.
462 Monadnock Block CHICAGO, ILL.

FOR SALE

Space under this heading is available at the following rates:

1 to 3 inches.....$4.30 an inch
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An inch is measured vertically on one column — three columns to a page. Any space may be used measured by the even inch in height and by one, two or three columns in width.

The price per inch is based on total space used — multiply ad space by number of continuous insertions.

3 BUCYRUS 225-B SHOVELS, in best of condition and working every day. Machines being offered on account of being about worked out on job. Address P. O. Box 65, Excavating Engineer, South Milwaukee, Wisconsin.

MODEL 205 P. & H. ½-YARD DRAGLINE OR CLAM. In first-class condition. Can be seen on job. Address **James Stearns, Antioch, Illinois.**

1-T MONIGHAN with Fairbanks Morse 60 H. P. CO engine, 45-foot boom and 2-yard bucket, and 15-foot boom extension with 1-yard bucket. Machine new in 1922. Location Dallas, Texas. Price reasonable. Address P. O. Box 63, Excavating Engineer, South Milwaukee, Wisconsin.

DRAGLINES; TWO NORTHWEST MACHINES, Model 104, Shop Nos. 135 and 315. 40-foot booms, one-yard buckets; both in good working condition. Address **W. M. Spencer Company, Independence, Missouri.**

LIDGERWOOD DRAGLINE, on skids. 1½-yard Page bucket, 50-foot boom, 60 H. P., horizontal boiler, in good condition. Location, Rockford, Illinois. Address P. O. Box 55, Excavating Engineer, South Milwaukee, Wisconsin.

MARION MODEL 60 RAILROAD TYPE, No. 2288;
MARION MODEL 51 RAILROAD TYPE, No. 2095;
MARION MODEL 61 RAILROAD-TYPE, No. 2812;
MARION MODEL 60 RAILROAD-TYPE, No. 1985;
BUCYRUS MODEL 70-C RAILROAD-TYPE, No. 1171;
MARION MODEL 30 RAILROAD-TYPE, No. 2285;

These shovels are located in eastern Pennsylvania in the anthracite coal district. Address P. O. Box 56, Excavating Engineer, South Milwaukee, Wis.

TYPE "O" THEW SHOVEL, ¾-yard, wheel traction, horizontal crowd, in good repair. Serial No. 613. Price very reasonable. Location Rock Island, Illinois. Address P. O. Box 54, Excavating Engineer, South Milwaukee, Wisconsin.

TYPE "O" VULCAN STEAM SHOVEL on traction wheels. Shop No. 1705. Machine now located at Lambertville, New Jersey. Address P. O. Box 50, Excavating Engineer, South Milwaukee, Wisconsin.

TYPE O ¾-YARD THEW. Horizontal crowd, traction wheel mounted shovel. Located central Illinois. Address P. O. Box 491, Excavating Engineer, South Milwaukee, Wisconsin.

220-B BUCYRUS STRIPPER, Shop No. 4212, 90-foot boom, 6-yard dipper, installed November, 1924, and actually stripped 900,000 yards of overburden;
50-B BUCYRUS LOADER, Shop No. 620, installed November, 1924, practically as good as new;
18-TON VULCAN LOCOMOTIVE, Shop No. 3266, A. S. M. E. specifications, practically new;
18-TON DAVENPORT LOCOMOTIVE, Shop No. 1026, A. S. M. E. specifications;
$30,000 COAL TIPPLE, including rotary dump, drag conveyor, double deck shaker screens, and two 48-inch loading booms, capacity 150 tons per hour;
32 5-TON PIT CARS;
2¾ MILES 35-POUND RAIL;
2500 FEET 60-POUND RAIL;
2 MILES 3-INCH PIPE LINE;
1200 FEET 2-INCH PIPE LINE;
INGERSOLL-RAND COMPRESSOR;
2 FERGUSON DRILLS;
BLACKSMITH EQUIPMENT.

All equipment practically new and in first-class condition. Property did not turn out as prospected. Prefer to sell as a unit, but will price items separately.

Address P. O. Box 492, Excavating Engineer, South Milwaukee, Wisconsin.

WHY WE WILL NOT CHEAPEN HERCULES DETONATORS

There are detonating compounds in use which are cheaper than the fulminate-chlorate composition which is in all Hercules Blasting Caps and Electric Blasting Caps. But the detonator is so important to the successful use of plosives that the Hercules Powder Company will not consider eaper ingredients until something is discovered which is actually as od and as certain under all conditions. The cost of a cap is too all an item in the total cost of blasting to make it worth while to ke chances by cheapening it.

r the same reason, only platinum is used for bridge wires in Hercules ectric Blasting Caps — broken bridges are practically unknown.

u pay no more for Hercules Detonators but you receive greater value.

HERCULES POWDER COMPANY

(INCORPORATED)

Dynamite *Permissible Explosives* *Blasting Powder* *Blasting Supplies*

Sales Offices:

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RCULES POWDER COMPANY,
949 King Street,
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Please send me your new booklet describing the advantages of Hercules Electric Blasting Caps.

Please have your nearest branch office quote on the following explosives and blasting supplies:

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Stripping off the overburden with a large electric dragline. Note the height of the spoil banks.

Cleaning up the coal surface in preparation for the loading operations. The dragline at the left is used for this purpose. In the center of the pit in the background can be seen the boom of the loading shovel pointing up over the face of the coal.